Name: _____   Date: _____
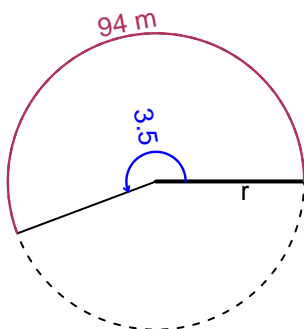
Trig Final (SLTN v664)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 94 meters. The angle measure is 3.5 radians. How long is the radius in meters?
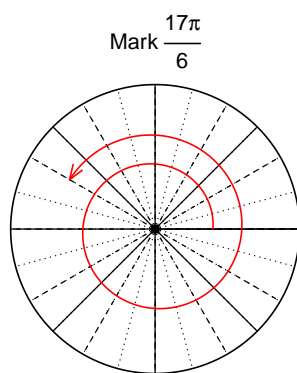

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
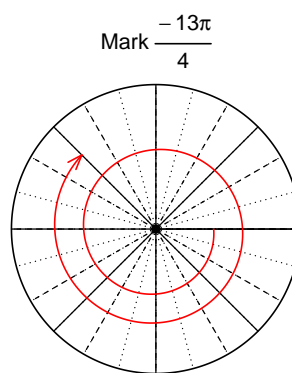
$r = 26.86$ meters.

Question 2

Consider angles $\frac{17\pi}{6}$ and $\frac{-13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{17\pi}{6}\right)$ and $\sin\left(\frac{-13\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{17\pi}{6}$

Find cos(17π/6)

Mark $\dfrac{-13\pi}{4}$
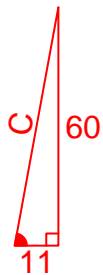
Find sin(−13π/4)

$\cos(17\pi/6) = \frac{-\sqrt{3}}{2}$

$\sin(-13\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{60}{11}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.
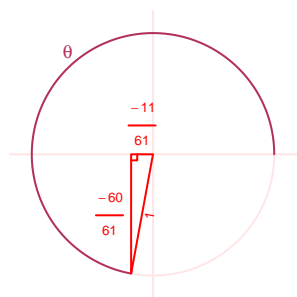
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$11^2 + 60^2 = C^2$$
$$C = \sqrt{11^2 + 60^2}$$
$$C = 61$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.

$$\sin(\theta) = \frac{-60}{61}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 4.69 Hz, a midline at $y = 7.5$ meters, and an amplitude of 2.25 meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -2.25\cos(2\pi 4.69t) + 7.5$$

or

$$y = -2.25\cos(9.38\pi t) + 7.5$$

or

$$y = -2.25\cos(29.47t) + 7.5$$